However, in the system of PTL 1, a piece of equipment, such as the elevator, is controlled on the basis of a signal transmitted to the piece of equipment by an object, such as the autonomous vehicle. Here, assume that a plurality of pieces of equipment are provided in a facility, such as a building, in the system and that a plurality of devices work in the facility. In this case, a communication format needs to be defined for each of combinations of pieces of equipment and devices. Thus, coordination between pieces of equipment and devices is not easy.

[0005]

The present disclosure relates to solving of the above-described problem. The present disclosure provides a communication system in which a piece of equipment in a facility and a device working in the facility cooperate easily with each other, an equipment server and a device server in the communication system, and a data structure which is to be communicated in the communication system.

[Solution to Problem]

[0006]

An equipment server according to the present disclosure includes a first communication unit configured to transmit and to receive a message in a common data format to and from a plurality of device servers, wherein each of the device servers is configured to communicate with at least one device in a facility and control the device, and an equipment control unit configured to control a piece of equipment in the facility on the basis of a message received by the first communication unit, wherein the message includes third information representing a process related to the message.

[0007]

A device server according to the present disclosure includes a second communication unit configured to transmit and to receive a message in a common data format to and from an equipment server configured to control a piece of equipment in a facility, and a device control unit configured to control a device in the facility on the basis of a message received by the second communication unit, wherein the message includes third information representing a process related to the message.

[0008]

A communication system according to the present disclosure includes an equipment server and a plurality of device servers, wherein the equipment server includes a first communication unit configured to transmit and to receive a message in a common data format to and from the plurality of device servers, and an equipment control unit configured to control a piece of equipment in a facility on the basis of a message received by the first communication unit, each of the plurality of device servers includes a second communication unit configured to transmit and to receive the message in the common data format to and from the equipment server, and a device control unit configured to control at least one device in the facility on the basis of a message received by the second communication unit, and the message includes third information representing a process related to the message.

[0009]

A storage medium according to the present disclosure is the storage medium for a message that is to be transmitted and received in a common data format between a plurality of device servers configured to communicate with at least one device in a facility and control the

device, and an equipment server configured to control a piece of equipment in the facility, wherein the message includes third information representing a process related to the message, and when any server of the plurality of device servers or the equipment server receives the message, the message is used for a process to cause a control target in the message to execute a process represented by the third information.

[Advantageous Effects of Invention]

[0010]

The equipment server or device server or the communication system according to the present disclosure allows a piece of equipment in a facility and a device working in the facility to cooperate easily with each other. The data structure according to the present disclosure also allows a piece of equipment in a facility and a device working in the facility to cooperate easily with each other.

[Brief Description of Drawings]

[0011]

[Fig. 1] A configuration diagram of a communication system according to Embodiment 1.

[Fig. 2] A chart showing an example of a structure of a topic name in a message in the communication system according to Embodiment 1.

[Fig. 3] A sequence chart showing an example of operation of the communication system according to Embodiment 1.

[Fig. 4] A sequence chart showing an example of operation of the communication system according to Embodiment 1.

[Fig. 5] A sequence chart showing an example of operation of the communication system according to Embodiment 1.

Claims

[Claim 1]

An equipment server comprising a first communication unit configured to transmit and to receive a message in a common data format to and from a plurality of device servers, wherein each of the device servers is configured to communicate with at least one device in a facility and control the device, and an equipment control unit configured to control a piece of equipment in the facility on the basis of the message received by the first communication unit,

wherein the message includes

third information representing a process related to the message.

[Claim 2]

The equipment server according to claim 1, wherein each of the device servers is configured to communicate with the at least one device in the facility in a data format different from the common data format and control the device.

[Claim 3]

The equipment server according to claim 1 or 2, wherein

the message includes first information for identification of the device.

[Claim 4]

The equipment server according to claim 3, wherein

the equipment control unit causes an access control apparatus that is the piece of equipment in the facility to authenticate the device on the basis of the first information.

[Claim 5]

The equipment server according to any one of claims 1 to 4, wherein

the device is a robot or a mobility device.

[Claim 6]

The equipment server according to any one of claims 1 to 5, wherein

the equipment control unit selects a piece of equipment to be controlled from among a plurality of pieces of equipment in the facility, on the basis of the third information.

[Claim 7]

The equipment server according to any one of claims 1 to 6, wherein

the equipment control unit causes the piece of equipment in the facility to start operation if the third information represents a request to start the operation of the piece of equipment.

[Claim 8]

The equipment server according to any one of claims 1 to 7, wherein

the equipment control unit changes an operating state of the piece of equipment in the facility if the third information represents a request to change the operating state of the piece of equipment.

[Claim 9]

The equipment server according to any one of claims 1 to 8, wherein

the device is a first device that is controlled by a first device server among the plurality of device servers and moves in the facility, and

the equipment control unit registers, in an elevator that is the piece of equipment in the facility, a hall call calling a first car of the elevator if the third information represents the hall call.

[Claim 10]

A device server comprising a second communication unit configured to transmit and to receive a message in a common data format to and from an equipment server configured to control a piece of equipment in a facility, and a device control unit configured to control a device in the facility on the basis of a message received by the second communication unit,

wherein the message includes

third information representing a process related to the message.

[Claim 11]

The device server according to claim 10, wherein

the message includes first information for identification of the device.

[Claim 12]

A communication system comprising an equipment server and a plurality of device servers,

wherein the equipment server includes a first communication unit configured to transmit and to receive a message in a common data format to and from the plurality of device servers, and an equipment control unit configured to control a piece of equipment in a facility on the basis of a message received by the first communication unit,

each of the plurality of device servers includes a second communication unit configured to transmit and to receive the message in the common data format to and from the equipment server, and a device control unit configured to control at least one device in the facility on the basis of a message received by the second communication unit, and

the message includes

third information representing a process related to the message.

[Claim 13]

The communication system according to claim 12, wherein

the message includes first information for identification of the device.

[Claim 14]

A storage medium storing a message that is to be transmitted and received in a common data format between a plurality of device servers configured to communicate with at least one device in a facility and control the device, and an equipment server configured to control a piece of equipment in the facility, wherein:

the message includes third information representing a process related to the message, and

when any server of the plurality of device servers or the equipment server receives the message, the message is used for a process to cause a control target in the message to execute a process represented by the third information.

[Claim 15]

The storage medium storing the message according to claim 14, wherein

the message includes first information for identification of the device.